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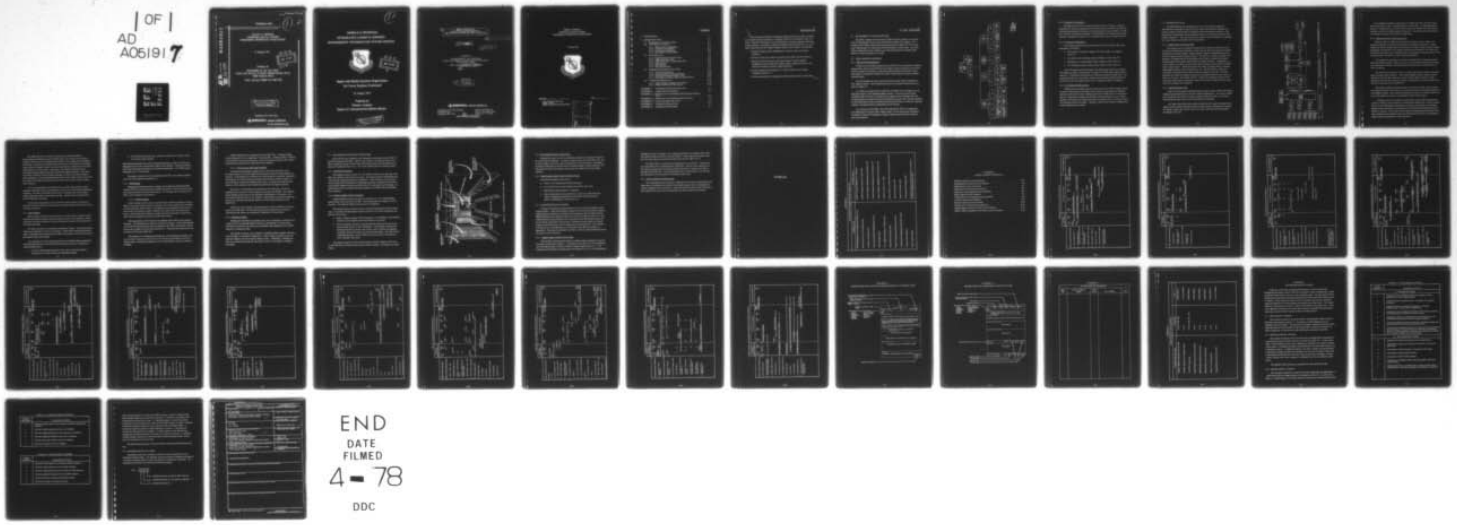

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MISSILE-X PROGRAM
INTEGRATED LOGISTIC SUPPORT
MANAGEMENT INFORMATION SYSTEM REPORT

31 August 1977

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Prepared for

DEPARTMENT OF THE AIR FORCE
SPACE AND MISSILE SYSTEMS ORGANIZATION (AFSC)
ICBM Program Office

Under Contract F04606-76-A-0087-R901

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ARINC RESEARCH CORPORATION

P.O. Box 1375/Santa Ana, Calif.

MISSILE-X PROGRAM

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Space and Missile Systems Organization

Air Force Systems Command

31 August 1977

Prepared by

Director, Logistics

Deputy for Intercontinental Ballistic Missiles

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Prepared by

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MISSILE-X PROGRAM
INTEGRATED LOGISTIC SUPPORT
MANAGEMENT INFORMATION SYSTEM REPORT

31 August 1977

Approved _____ Date _____

Lester E. Eklund, Colonel, USAF
Director, Logistics
Deputy for Intercontinental Ballistic Missiles

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1 INTRODUCTION

This document describes the Management Information System (MIS) developed by the Deputy Program Manager for Logistics (DPML) for the Missile-X (MX) Program. This MIS is designed to aid in the integration of logistic support elements for the MX Program, from system validation through production/deployment. As a program control tool for MX integrated logistic support (ILS) activities, the MIS will:

- Provide milestone charts displaying key events for each of 12 logistic elements.
- Provide a system for dynamic reporting of the status of the ILS program.
- Display the information from which the Integrated Logistic Support Management Team (ILSMT) will identify issues, assign action items, and track the resolution of logistic support problems.
- Identify potential/actual problems in a timely manner for developing acceptable solutions, and
- Provide a structure for managing the logistic support analysis (LSA) data.

2
ILS MIS STRUCTURE

2.1 MANAGEMENT OF ILS MIS ACTIVITIES

The DPML manages and directs the ILS MIS through his position as chairman of the ILS Management Team and ILS technical interchange (TI) meetings. He is assisted by the Logistic Support Management Information (LSMI) LEM, who serves as the administrator for organizing and disseminating ILS-related data. The LSMI-LEM is responsible for the operation of the MIS and assists the remaining LEMs relative to their participation in the MIS.

2.2 USER-OPERATOR PERSONNEL

2.2.1 MIS Personnel Organization

Crucial to the successful operation of the ILS MIS is the cooperation of engineering personnel, project element officers and logistic technical personnel who will provide the necessary evaluations of contractor-prepared logistic data (CDRL items). This support is essential to facilitate the LEMs' monitoring and tracking of support activities status.

The ILS Management Team includes the DPML and the LEMs designated for each logistic element. Their functional location in the Program Office structure is shown in Figure 2-1.

The LEM is the single point of contact for the DPML in the management of all integration aspects of the assigned logistic element. He assures that the tasks associated with his element, as defined in the Logistic Element Management Plan, are implemented; provides liaison and coordination among the other element managers for the achievement of ILS; and assures that relevant ILS data are collected, analyzed, reported, and disseminated as appropriate for his element.

As a member of the ILSMT, each LEM supports the DPML in managing the accomplishment of Program Office logistic tasks, and in acquiring the information necessary to assure the integration of logistic support elements into the total program requirements.

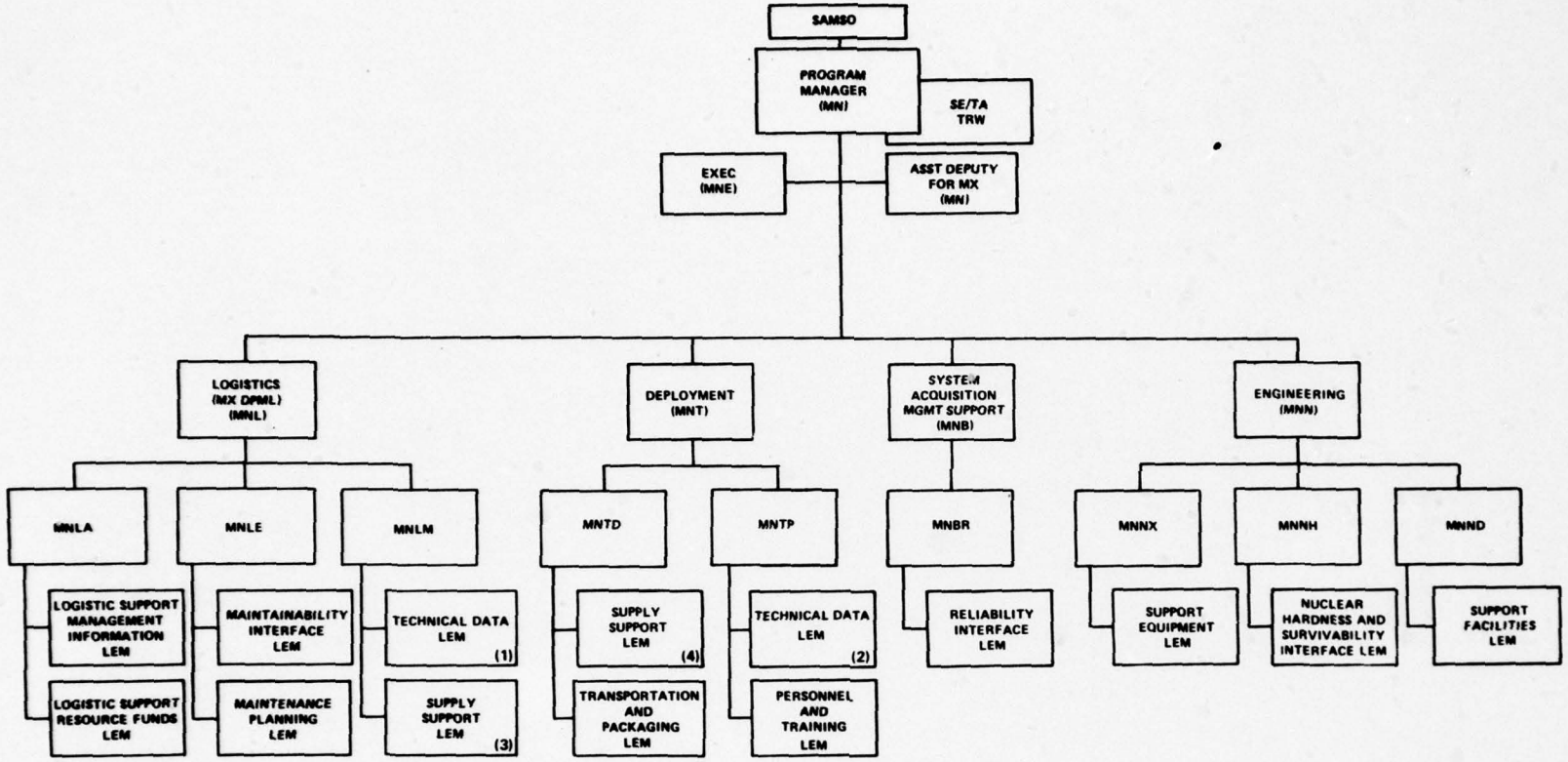


Figure 2-1. MX Program Logistic Element Managers

2.2.2 Contractor Participation

Throughout the full scale development phase of the MX Program, technical discussions on various subsystems will require that representatives from associate contractors periodically participate in ILS technical interchange meetings. In addition, associate contractors participate in the ILS MIS by developing the information required to manage ILS activities or as recipients of the system's output products.

2.2.3 Government Participation

The following resident liaison offices within the ICBM Program Office will participate in the ILSMT:

a. Directorate of Aerospace Logistics (LX/AFLC/AQS), Los Angeles AFS, CA.

b. San Antonio ALC Operating Location (SWOSA), Norton AFB, CA.

c. Strategic Air Command System Office (SACSO), Norton AFB, CA.

d. Air Training Command Resident Office (ATB), Norton AFB, CA.

Other DoD agencies will participate in the MIS through ILSMT and technical interchange meetings, and through the exchange of ILS information with the MIS as required. All interface activity shall be coordinated through the LSMI-LEM. Performing this interface via the MIS is essential since the information transfer will involve more than one logistic element and a coordination effort is necessary.

2.2.4 ILS-Related Working Groups

Multicommand working groups are being formed by the ICBM Program Office to assure intercommand coordination where needed in MX program development. Interface between ILS-related working groups and the ILSMT serves to provide the degree of information exchange and personnel contact beneficial to each. Where possible, this interface is conducted through an individual who is a member of both the working group and the ILSMT. Appendix A lists the ILS-related working groups and the MIS personnel contacts.

2.3 INFORMATION FLOW

The MIS facilitates the development and use of ILS-related management information by providing the vehicle needed to collate and transform associate contractors' logistic technical data into program status and planning information. The general flow of information and the personnel involved are discussed below and illustrated in Figure 2-2. The reader may find it useful to refer to that figure for perspective as the details of information flow are presented.

2.3.1 Logistic Element Technical Data

The primary source of logistic element technical data is the CDRL items provided by the MX associate contractors. These data are mainly the products of System Requirements Analyses (SRAs), Logistic Support Analysis, Maintainability analysis and other logistic related subtasks of SRAs. The data are reviewed, evaluated, and approved (or disapproved) by the cognizant Project Officer, assisted by technical personnel within the Program Office having the related expertise. Additionally, as seen in Figure 2-2, data are received from other sources, both internal and external to the Program Office. These data include the results of design reviews, technical interchange meetings, tests and evaluations, etc. Results of these reviews and evaluations are provided by the LEMs as input summaries to the MIS. Technical personnel are limited to assigned subsystems or equipment because of the volume of data to be reviewed. The LEMs, however, consider the activities of their element across the entire system and therefore analyze the results of subsystem data evaluations from a system level viewpoint.

2.3.2 LSRF Information Flow

Figure 2-2 shows that the Logistic Support Resource Funds (LSRF) LEM obtains funding requirements data from the other LEMs as appropriate. He receives logistic fund expenditure data from the Program Control Directorate (MNP), and Project Officers provide data relative to fund availability and allocation.

The LSRF-LEM utilizes these data to identify the ILS Program funding requirements, provide funding estimates, prepare funding schedule requirements, forecast the logistic support cost portion of life cycle costs, and track the funds expended for logistic resources.

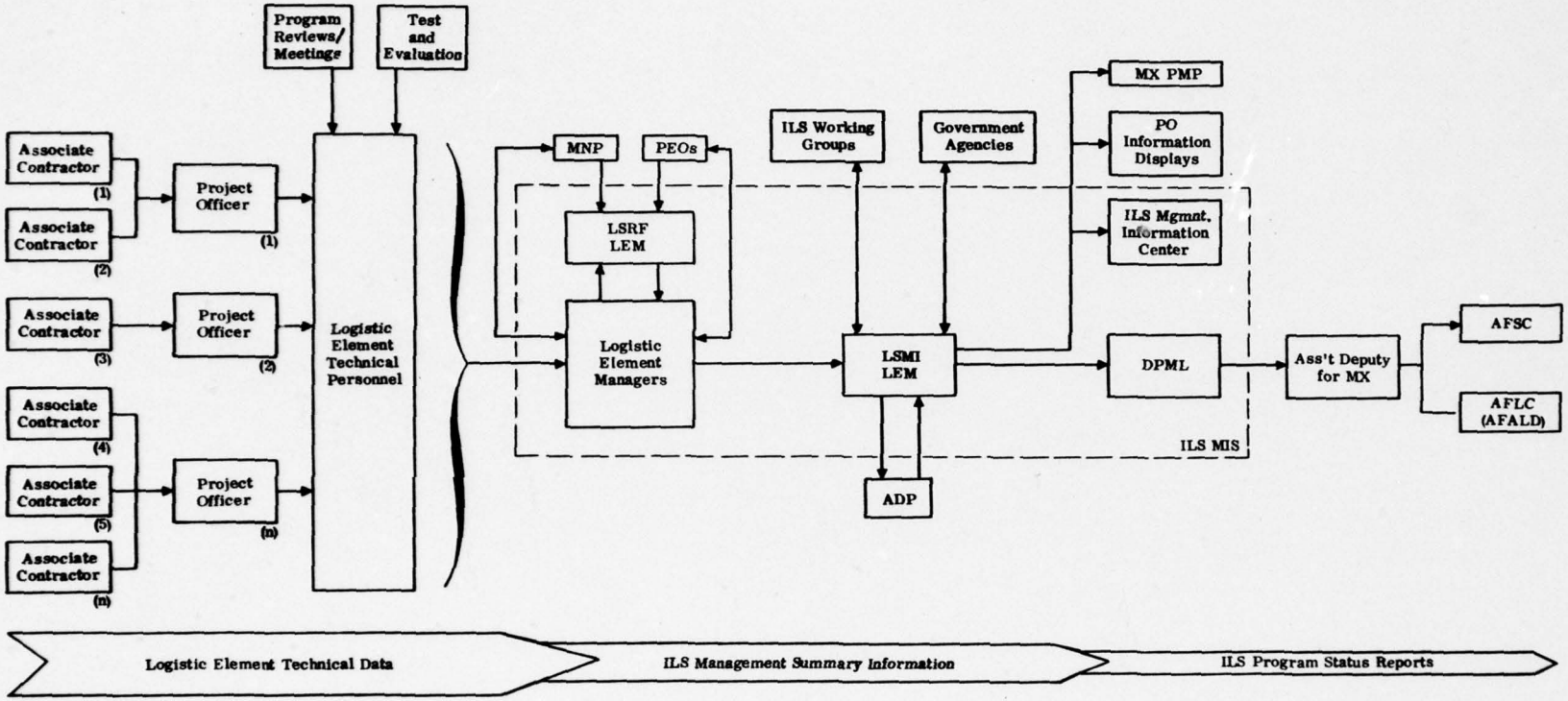


Figure 2-2. Information Flow of the ILS MIS

The funding information is organized by the LSRF-LEM into a format directly usable by the DPML, other acquiring activities, and the MIS. Through participation in the LCC Working Group, the LSRF-LEM is involved in SAMSO LCC/DTC analysis activities and also the logistic support cost studies. The summarized result of these cost analyses are input to the MIS by the LSRF-LEM.

2.3.3 LSMI-LEM's Role in Information Flow

Within the MIS, the LSMI-LEM evaluates the program status, funding, and planning information in preparing comprehensive management summaries. These summaries include briefing material and minutes from MIS meetings, problem/impact statements, ILS schedules, and computer summaries of LSAR data. The LSMI-LEM coordinates the efforts of the remaining LEMs in organizing the summaries into a form directly usable by the DPML and other cognizant personnel.

ILS management summaries are used by the LSMI-LEM in preparing program status and planning reports, which are required by the DPML in performing briefings and responding to requests for information from Program Office personnel and Air Force commands.

The LSMI-LEM coordinates the flow of logistic data from the MIS to automated data processing (ADP) personnel. This includes logistic support analysis records (LSAR) and the input data required to execute Program Office computer models. Requests to ADP personnel from any member of the ILSMT for computer output products will be processed by the LSMI-LEM.

Information available through the system is used by the LSMI-LEM to prepare and maintain a system-level (Tier 1) ILS summary schedule and detailed schedules for each logistic element. These schedules depict major events and decision points relative to that support element for each subsystem of the weapon system.

A schedule has been developed for each logistic element depicting significant events in relation to major subsystem milestones (see Appendix B). These schedules will aid in the identification of appropriate milestones for inclusion in the detailed logistic element schedules to be developed by the LSMI-LEM following the award of hardware contracts. Each LEM will use subsystem planning data pertaining to hardware development and testing to tailor the schedules provided herein in planning the support features appropriate for each subsystem.

The LSMI-LEM will coordinate the efforts of the remaining LEMs in incorporating the individual element schedules into a set of master ILS schedules. Using for reference the interrelationships described in the Logistic Element Management Plans, much of this coordination effort will involve consideration of the planned events across all logistic elements in terms of prerequisite requirements and events which should occur concurrently. Specifically, the detailed schedules must be coordinated across multiple subsystems and multiple logistic elements. The schedules will be included in the MX Program Management Plan and selected schedules will be displayed in the ILS Management Information Center (MIC) located in room 732. The master ILS schedule information will be used as input to other Program Office control displays.

A major responsibility of the LEMs will be to monitor the activities of their respective elements to obtain the information needed by the LSMI-LEM in updating the schedules. The status of scheduled events will be a standard topic for discussion during ILSMT and technical interchange meetings. Results of the meetings will be used in updating the schedules.

It will be the responsibility of each individual LEM to perform briefings and respond to detailed requests for information from Program Office personnel and other Air Force commands.

2.3.4 Status Reports

Status reports as defined herein include the recorded results of ILSMT and ILS technical interchange meetings, progress reports on action items assigned, problem summaries and impact statements, and any information in general which impacts the ILS master schedules.

ILS status reporting is accomplished during MIS meetings. Interactions between LEMs can be expected to occur on a daily basis. Where these interactions affect the status of existing system information, the effect is summarized by the LEMs involved and reported at the next meeting.

Two reporting forms have been developed for use within the MIS to standardize reporting procedures and record the detailed information required to identify and resolve problem areas:

a. The ILS Problem/Impact Statement form used to document problems as they arise, for later discussion during MIS meetings.

b. The ILS MIS Action Item form, used in the resolution of problems during the conduct of MIS meetings.

MIS meeting discussions may result in related action items, and the two forms are designed to permit cross-referencing of data for this situation. The forms and their information recording instructions are provided in Appendixes C.1 (Problem Impact Statement) and C.2 (Action Item).

The status of action items will be displayed in the MIC room using an enlargement of the form depicted in Appendix C.3.

2.3.5 MIS Meetings

Management Information System meetings will include both scheduled ILSMT meetings and ILS technical interchange meetings conducted to resolve problems which may require associate contractor participation. All meetings will be chaired by the DPML or his designated representative.

2.3.5.1 ILSMT Meetings

ILSMT meetings will be held on a periodic basis to enable the LEMs to brief the DPML on the status of their respective elements, and receive support from the DPML in performing their LEM functions. The agenda of the meeting will include an action item review, presentation of status reports by each LEM, and an open discussion period. Topics discussed during the meeting will provide information needed by the LSMI-LEM in updating ILS schedules and MIC status boards.

When appropriate, action items will be assigned at the request of the meeting chairman. All participants are subject to action item requests. During each meeting, a review of current action items will be conducted by the LSMI-LEM, and the results will be used to update the Action Item Status Board. Completed action item forms will be placed on file by the LSMI-LEM.

The schedule for conducting the meetings can vary throughout the program, but shall be frequent enough to permit issues to be discussed and problems resolved on a timely basis. Initially the meetings will occur semimonthly, on the first and third Tuesdays.

ILSMT meetings will be administered by the LSMI-LEM. A standard agenda will be developed for use in organizing meeting activities. Meeting minutes, including a brief summary of the proceedings and a copy of the briefing materials used, will be prepared by the LSMI-LEM for distribution to all attendees.

2.3.5.2 ILS Technical Interchange Meetings

ILS technical interchange meetings will be conducted by the DPML on an as-required basis, and will be supported by associate contractor representatives as required. TI meetings will be conducted to review the status of associate contractors' ILS programs, to evaluate technical problems which impact on logistic support, to review progress of previously assigned action items, to assign new action items as required, and to implement other efforts associated with the logistic program.

Requests for TI meetings will be submitted to the LSMI-LEM, and may be originated from any source, either internal or external to the ILSMT. The requestor should identify specific issues to be addressed, participants to be included, and a recommended date and place for the meeting. Requirements for contractor participation will be coordinated through the respective Project Element Officers by the LSMI-LEM.

Notification of the meeting, including an agenda, will be provided to all participants by the LSMI-LEM. He will assure that the proceedings of the meeting are recorded and that minutes are prepared for distribution to all attendees.

2.3.6 Information Quality

Management information is generally in the form of estimates in which there is a degree of risk in assuming that the estimate is representative of actual values. This degree of risk will vary within some acceptable range depending on the method employed in obtaining the data.

Data quality of criteria, and a method for assigning quality ratings to data used in the ILS MIS, are discussed in Appendix E. These criteria are based on how the data were obtained, and hence imply a degree of risk. Additionally, evaluation criteria are presented that weigh the risk of data in terms of its impact on schedules and budget.

2.4 MANAGEMENT INFORMATION CENTER (MIC)

Room 732 has been designated as the Management Information Center (MIC) for the MX ILS program activities. Figure 2-3 is a sketch of the general layout of the MIC, showing the location of those major ILS schedule-status and miscellaneous displays to be maintained in the room. The various display types are discussed below.

2.4.1 ILS Element Schedules

This display consists of twelve 48" x 36" panels mounted on the right wall of the MIC room (relative to the front of the room). Each panel contains a photoenlargement of the element schedules appearing in Appendix B. These schedules are used to provide the LSMI-LEM with guidance in identifying appropriate milestones for inclusion in the detailed logistic element schedules which he is responsible for developing. All LEMs will provide the schedule and status changes to the LSMI-LEM for developing these schedules.

2.4.2 Detailed Logistic Element Schedules

Detailed logistic element schedules will occupy the 96" x 72" sliding display panels located on the left wall of the MIC. Each sliding panel will display one of ten elements. The LSMI and LSRF elements will not be displayed.

ILS activities will be tracked by means of detailed schedules for all MX subsystems. The method of displaying the logistic element for each of the subsystems will take one of two forms:

a. When a minimum amount of ILS information is to be displayed, all subsystem status for a given logistic element will appear on one panel.

b. For the remaining elements, removable plastic sheets will be used to display schedules for one or more subsystems. These plastic sheets will be indexed and stowed to permit ready access, both for display and updating. The plastic sheets will contain only schedule information. The vertical axis containing fixed data, and the calendar increments on the horizontal axis will be attached to the panel.

Information contained in these detailed logistic element schedules will be used by the LSMI-LEM to develop the third major schedule display – ILS program summary status.

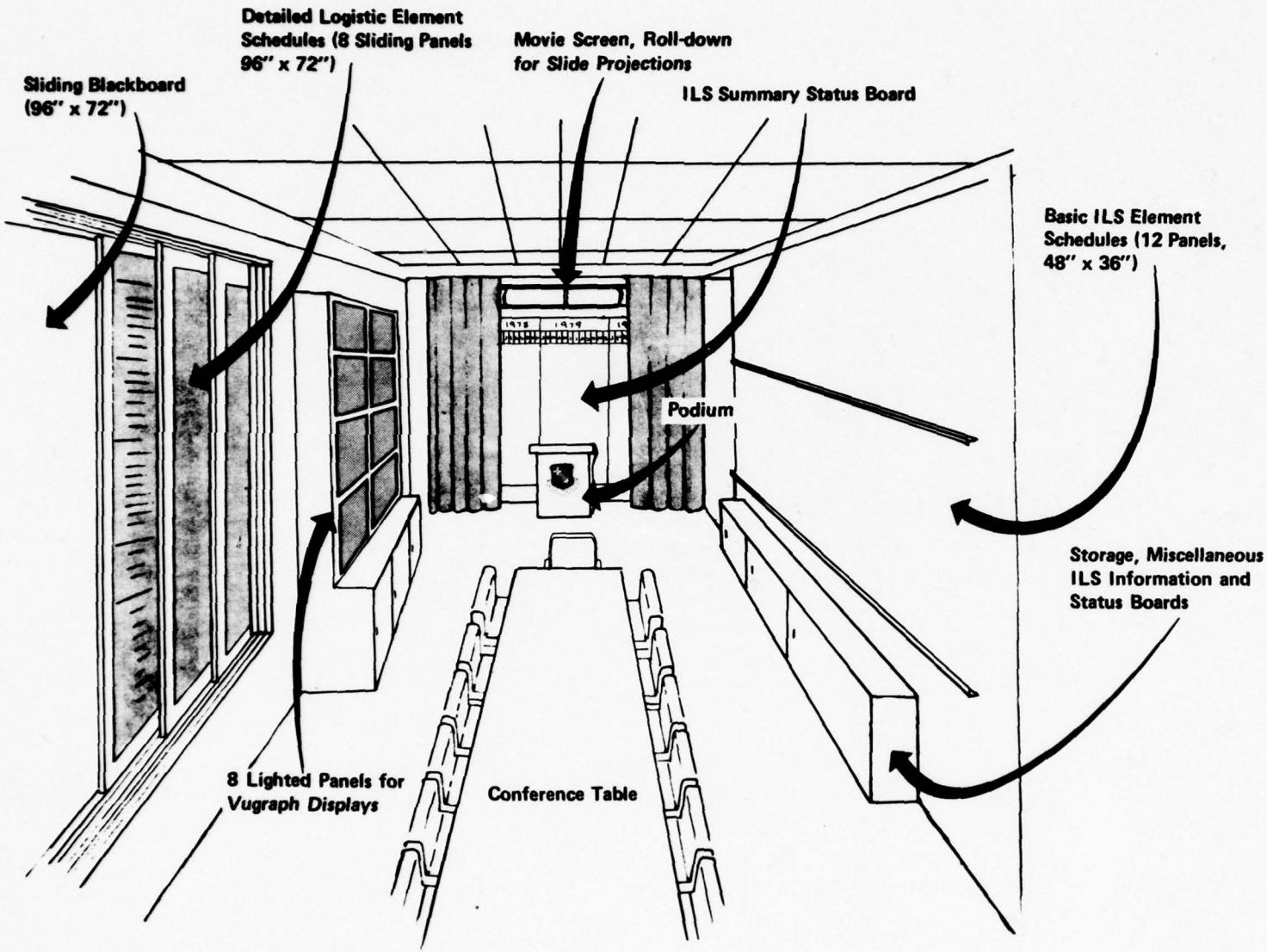


Figure 2-3. Management Information Center (MIC)

2.4.3 ILS Program Summary Status Panel

This panel provides the top-level visibility essential for tracking the status of the overall MX ILS program. The panel is located in the front of the MIC room, and is used to display a summary status of the system-level ILS program. Information presented on this panel is selected from the detailed logistic element schedules, and represents the major ILS program events across all subsystems and all logistic elements.

2.4.4 Miscellaneous Display Media and Status Boards

Miscellaneous display media include:

a. One 96" x 72" sliding wall-mounted blackboard

b. One pull-down movie screen located in the front of the room

c. Eight lighted display panels for viewgraphs

d. Easel-mounted status boards stowed in a rack on the right side of the room for displaying miscellaneous information; action item status boards, briefing agenda, directories, etc.

2.5 COMPUTERIZED DATA SOURCES

A number of computerized data banks are in use or under development by the Program Office. Types of information available from these sources include logistic support analysis summaries, operational and maintenance data for ICBM systems, MINUTEMAN test and evaluation results, life cycle cost analysis results, etc. The available historical data and that to be accumulated for the MX weapon system will aid the LEMs, particularly in the process of identifying requirements for tradeoff studies and determining the level of analysis that can be performed. The computerized data sources most applicable to the activities of the MIS are identified in Appendix D. The expected availability and Office of Primary Responsibility (OPR) for each source is also indicated.

2.5.1 Logistic Support Analysis Record Data

MX associate contractors will perform a logistic support analysis as a part of the system requirements analysis. A description of how the LSA is to be performed, and of its data products, is found in ICBM PO Engineering Directive 77-6. The computerized LSAR data processing system developed by the U.S. Army Maintenance

Management Center, Lexington, KY, is being implemented for Program Office use by the Logistics Plans and Analysis Division (MNLA). LSA computer summaries available from this system are described in MIL-STD-1388 and AMCP 750-16.

The LSMI-LEM will manage the mechanization of the LSAR data. Requests for LSA summaries will be made through the LSMI-LEM. Both the LSA summaries and the results of special LSA evaluations performed by the ILS contractor are input to the MIS by the LSMI-LEM. Results obtained by other LEMs through use of LSA data and summaries are also reported to the ILSMT as they occur.

2.5.2 Other Computerized Data Sources

The remaining data sources listed in Appendix D are not part of the ILS MIS, but these data are available to the LEMs on an individual basis to aid in developing information in support of the ILS program. Each LEM should be familiar with the information available from each source in preparation for its use when the need arises.

APPENDIXES

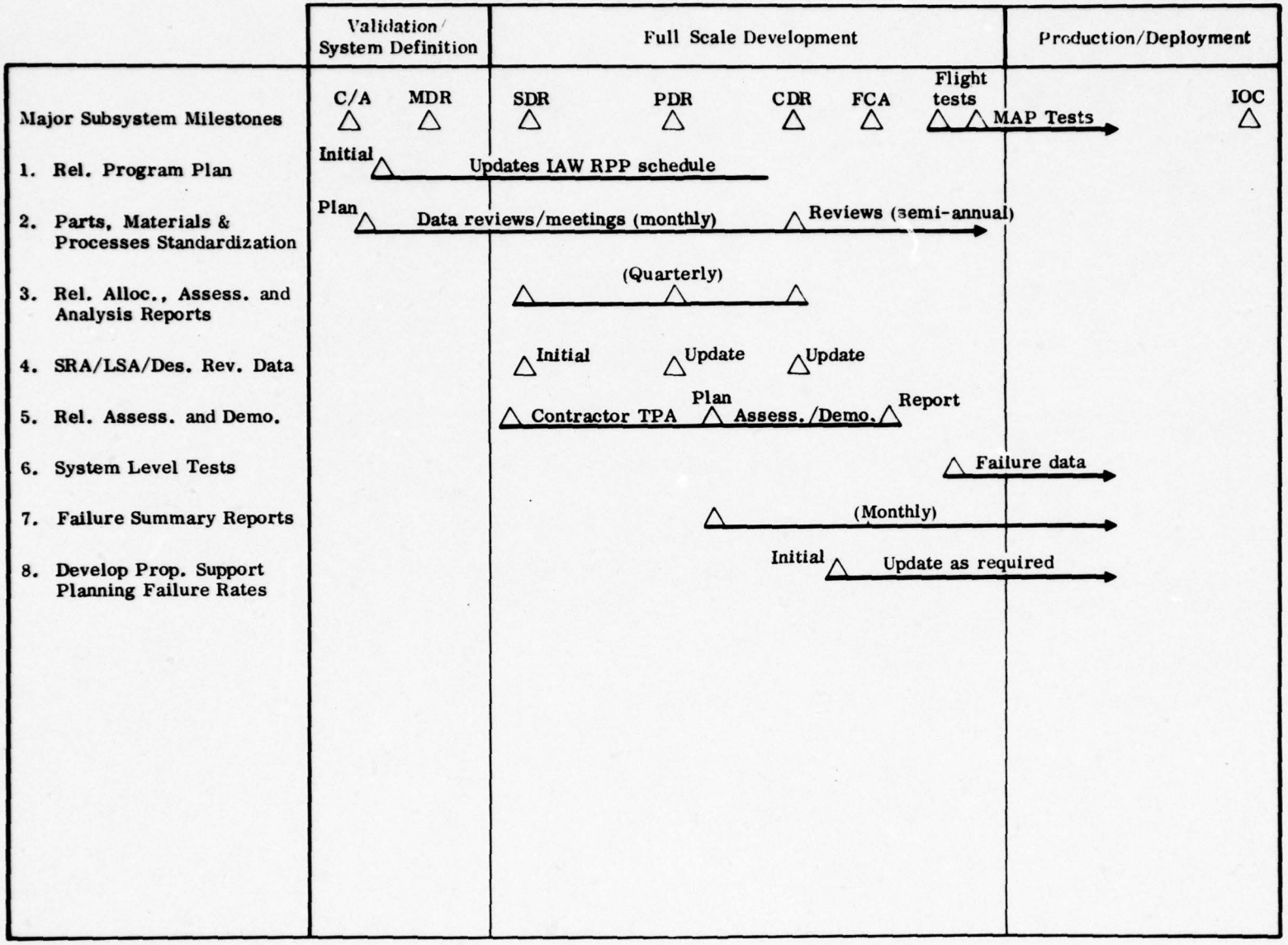
APPENDIX A

ILS-RELATED WORKING GROUP DIRECTORY	
Working Group	**ILS MIS Contact**
MX Maintenance and Logistics Working Group	Deputy Program Manager for Logistics
MX Life Cycle Cost Working Group	Logistic Support Resource Funds LEM
Transfer Working Group	Logistic Support Management Information LEM
Test and Evaluation Management Group	Logistic Support Management Information LEM
Test Working Group	Logistic Support Management Information LEM
T.O. Support Interface Working Group	Technical Data (T.O.) LEM
Joint Usage Working Group	Supply Support (Preoperational and Operational) LEMs
Support Equipment Assessment Council	Support Equipment LEM
Architectural Engineering Selection Board	Support Facilities LEM
Human Factors Board	Personnel and Training LEM
Parts Control Board	Reliability Interface LEM and Nuclear Hardness and Survivability Interface LEM

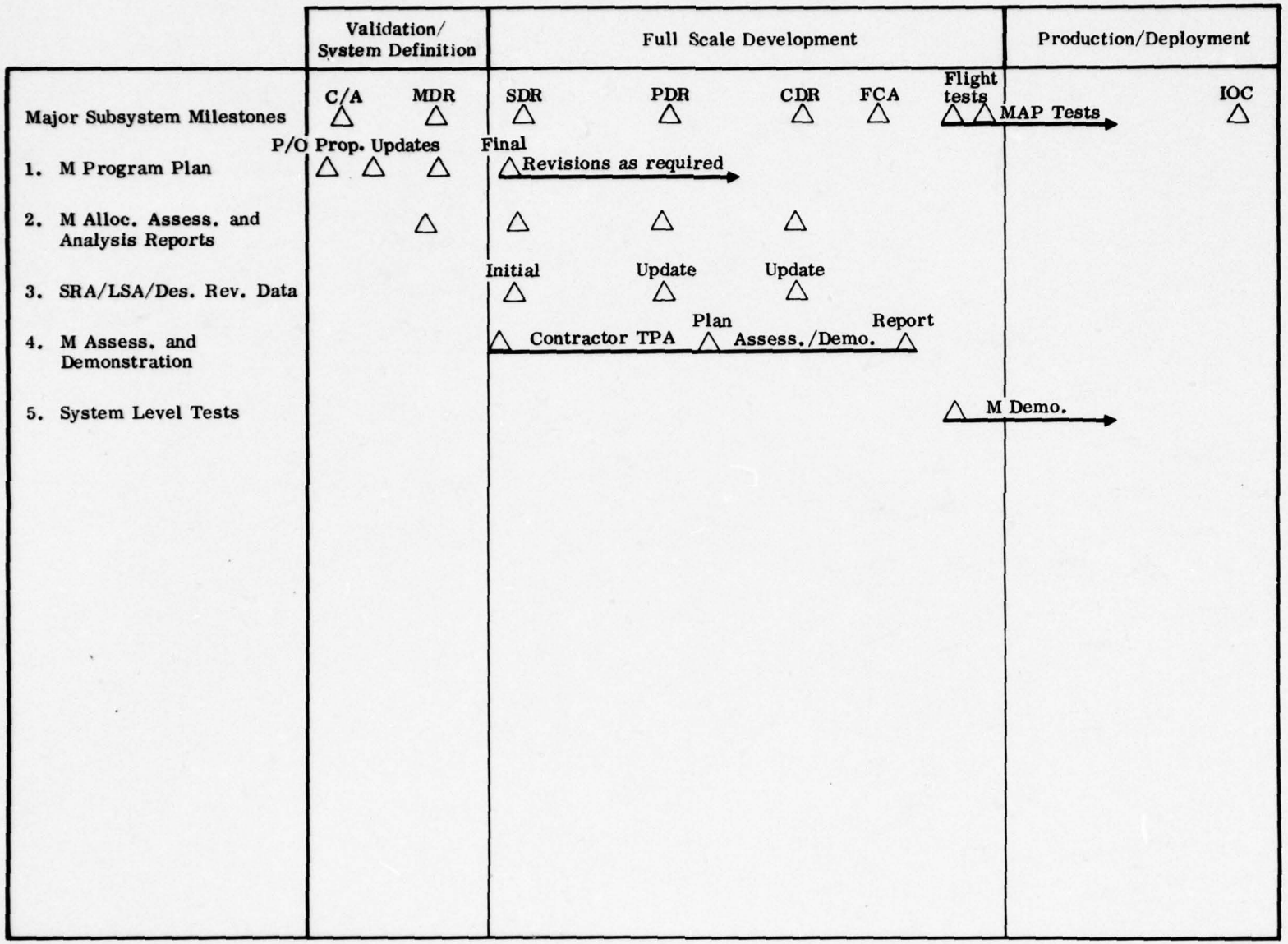
APPENDIX B
LOGISTIC ELEMENT SCHEDULES

Reliability Interface Element Schedule B-2
Maintainability Interface Element Schedule B-3
NH&S Interface Element Schedule B-4
Maintenance Planning Element Schedule B-5
Support and Test Equipment Element Schedule B-6
Supply Support Element Schedule. B-7
Transportation and Packaging Element Schedule B-8
Technical Data Element Schedule B-9
Support Facilities Element Schedule B-10
Personnel and Training Element Schedule. B-11
Logistic Support Resource Funds Element Schedule B-12
Logistic Support Management Information Element Schedule B-13

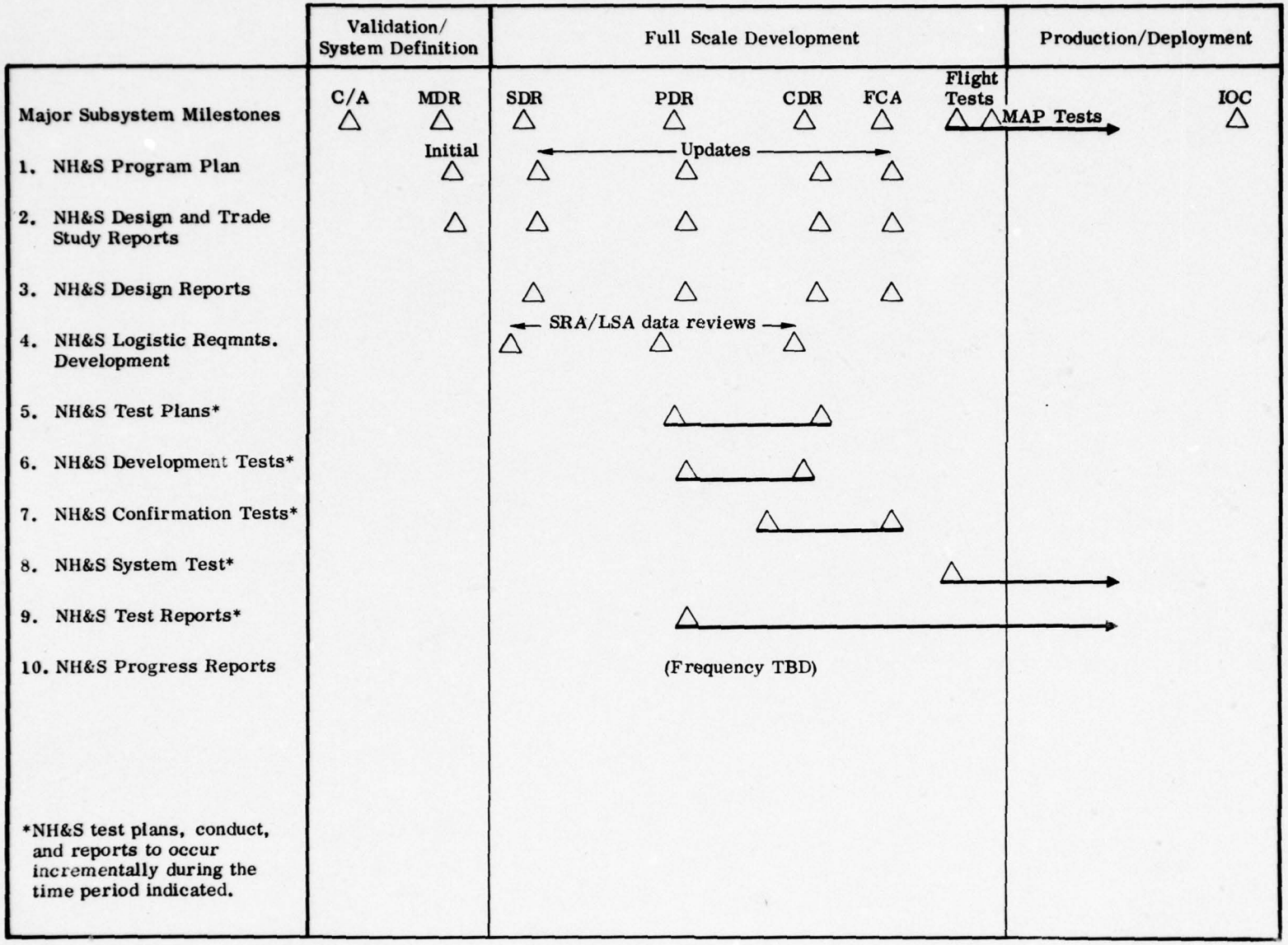
RELIABILITY INTERFACE ELEMENT SCHEDULE



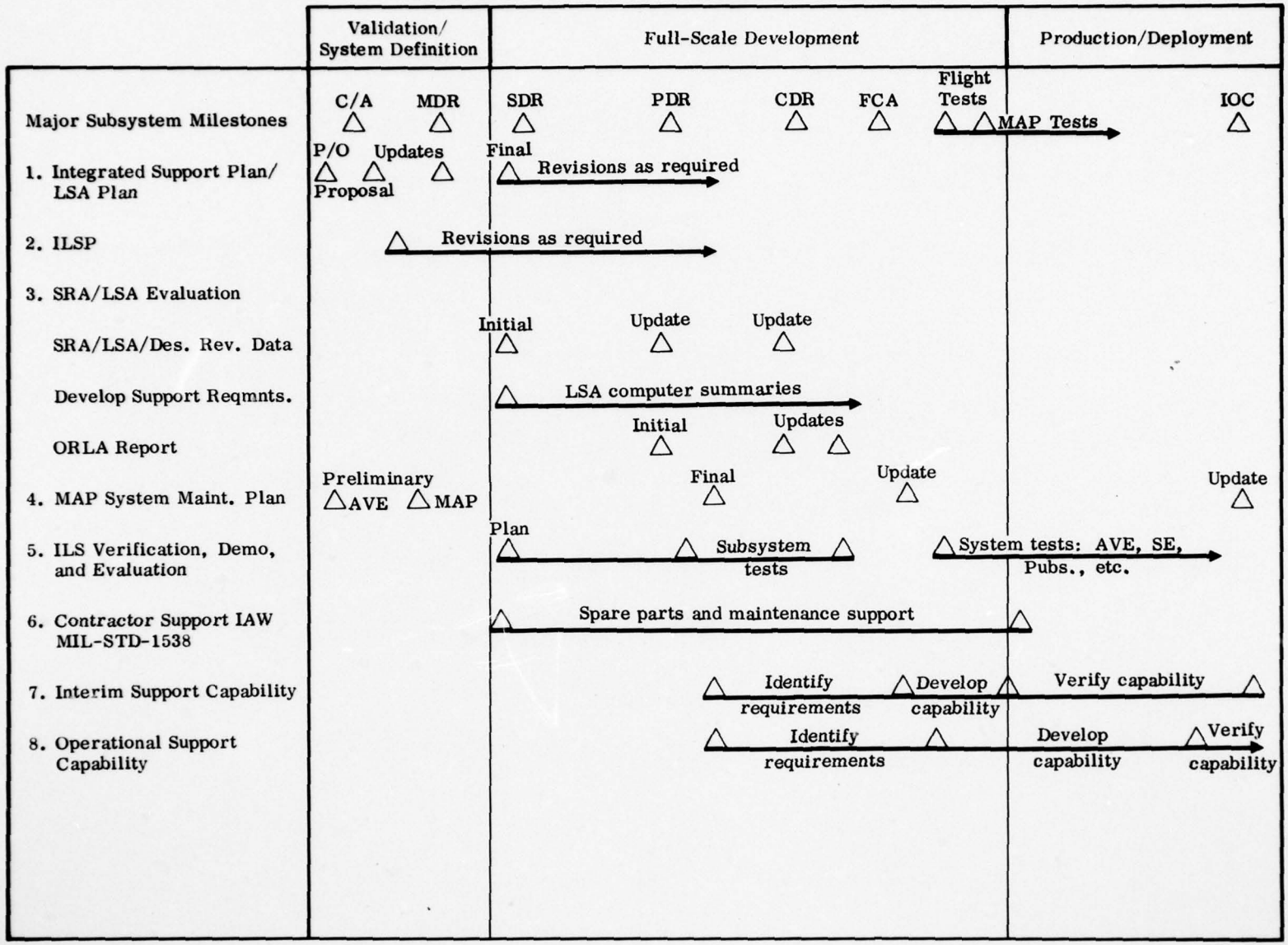
MAINTAINABILITY INTERFACE ELEMENT SCHEDULE



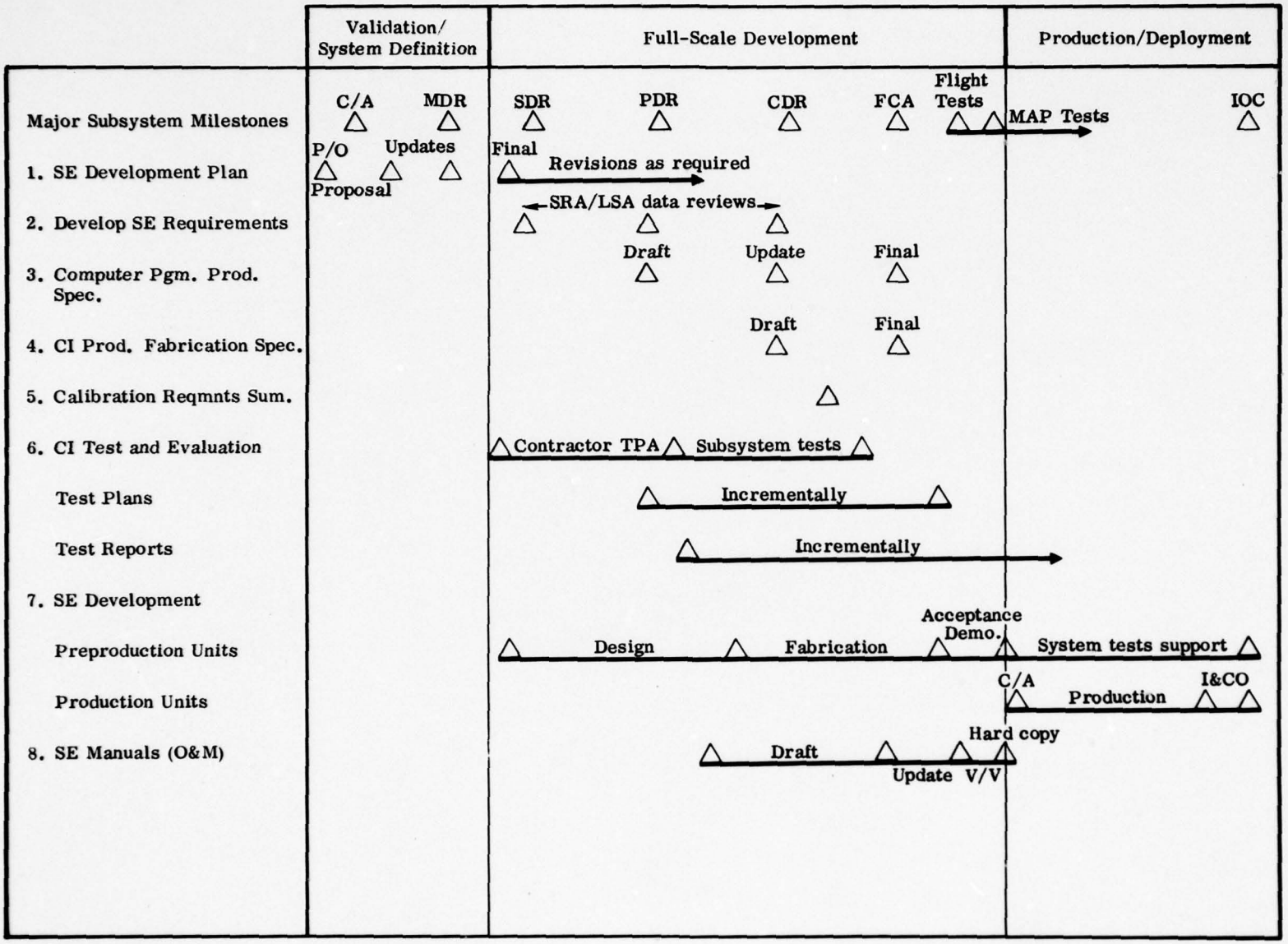
NH&S INTERFACE ELEMENT SCHEDULE



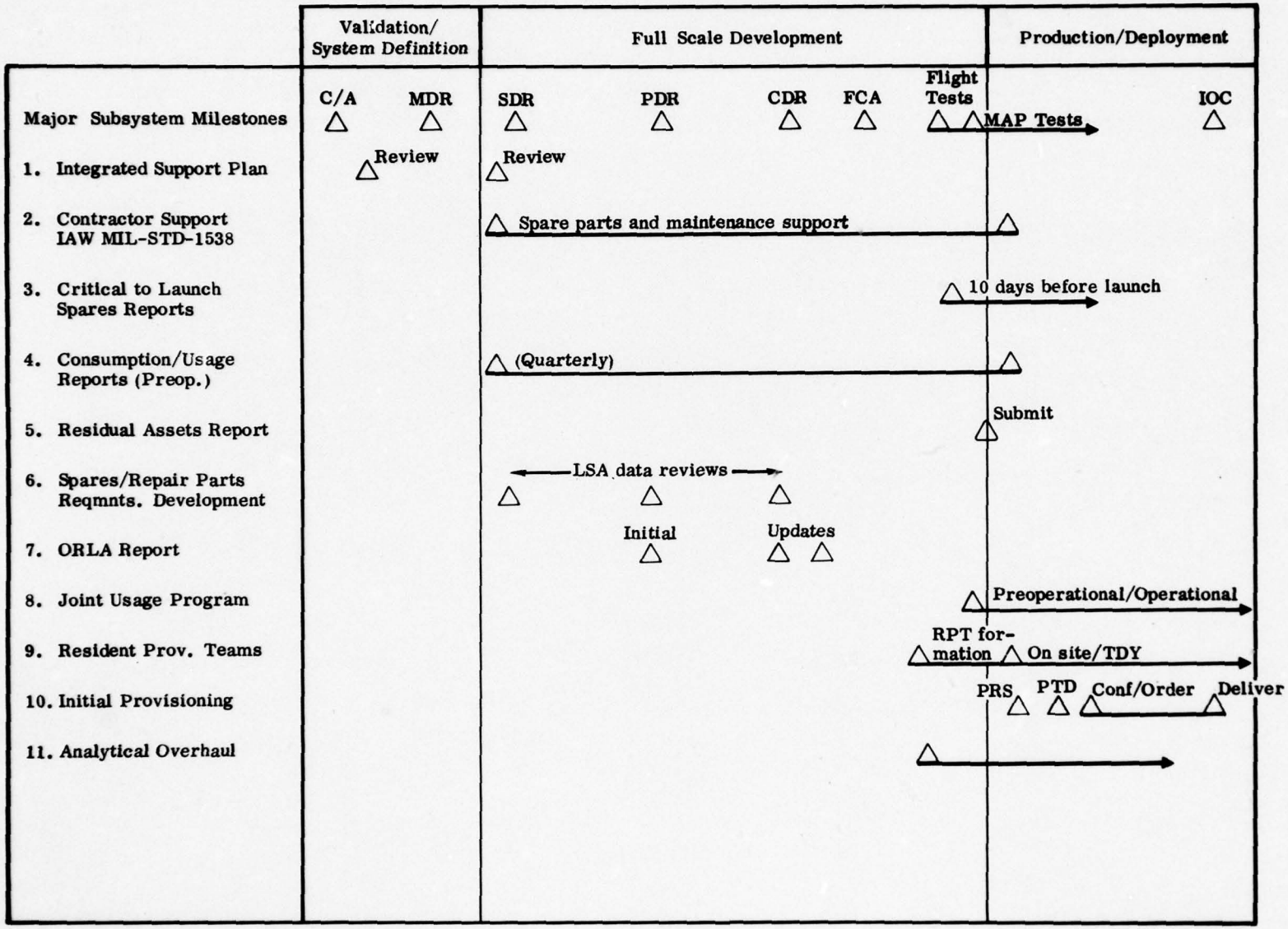
MAINTENANCE PLANNING ELEMENT SCHEDULE



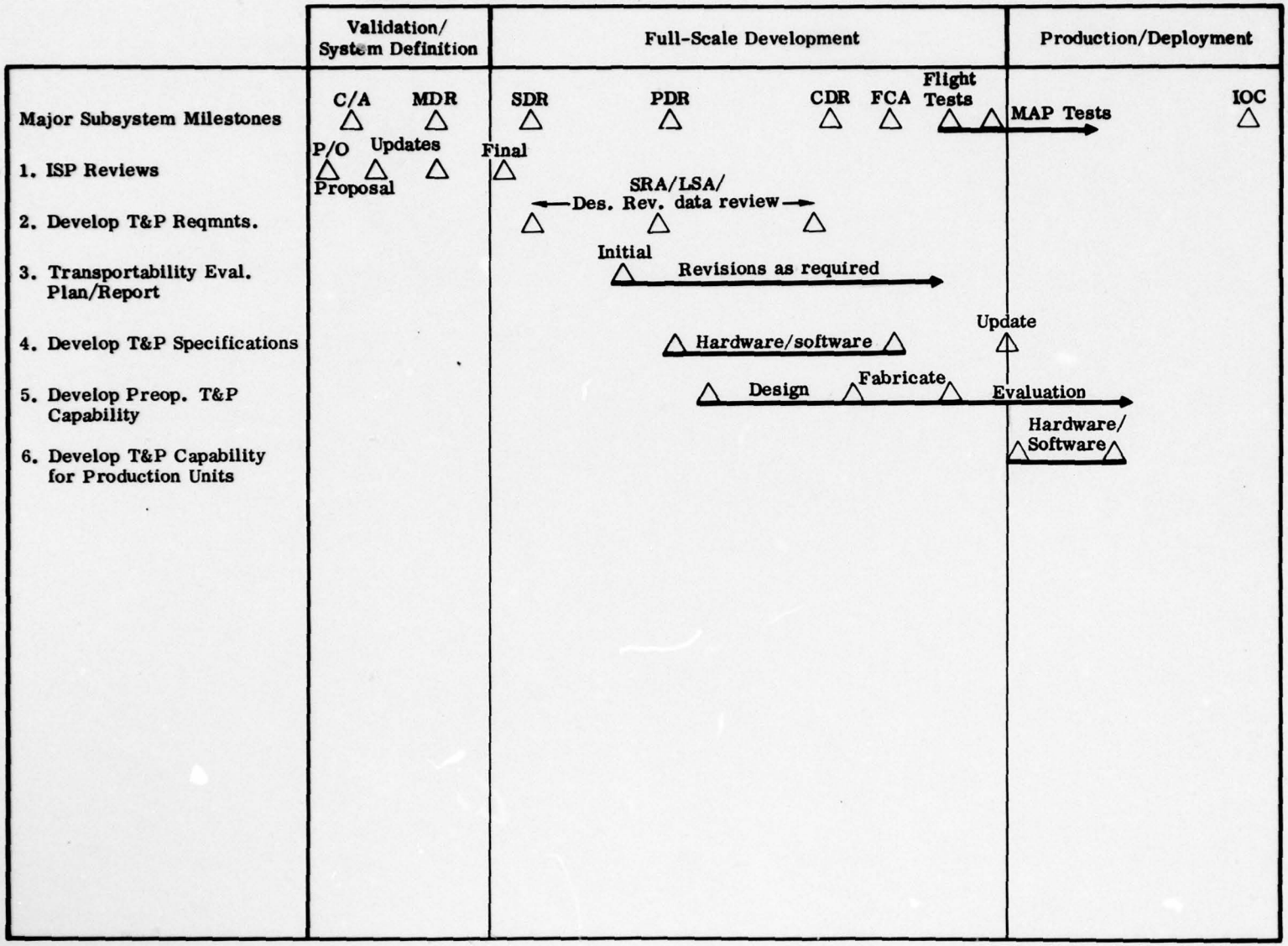
SUPPORT AND TEST EQUIPMENT ELEMENT SCHEDULE



SUPPLY SUPPORT ELEMENT SCHEDULE



TRANSPORTATION AND PACKAGING ELEMENT SCHEDULE



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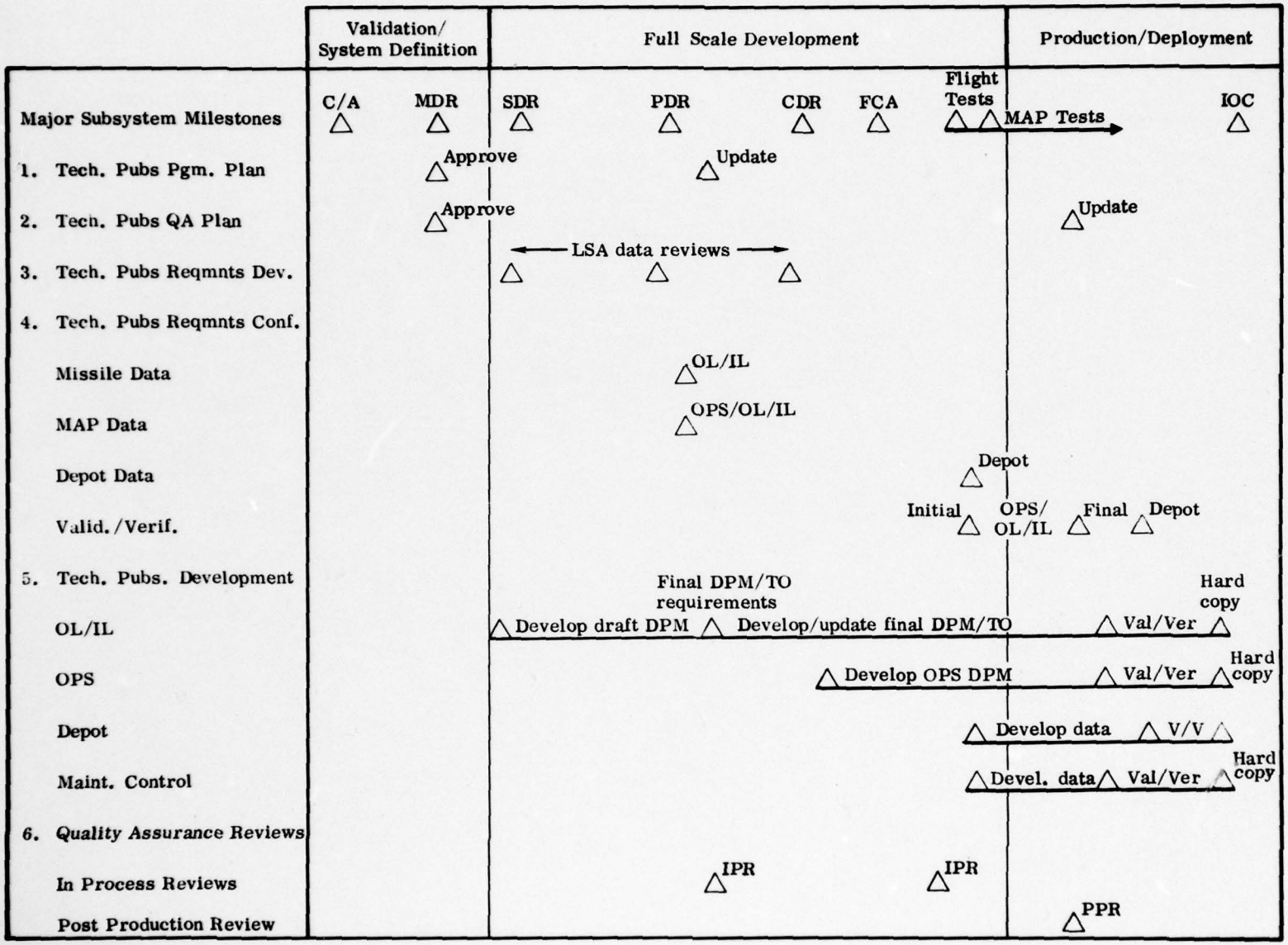
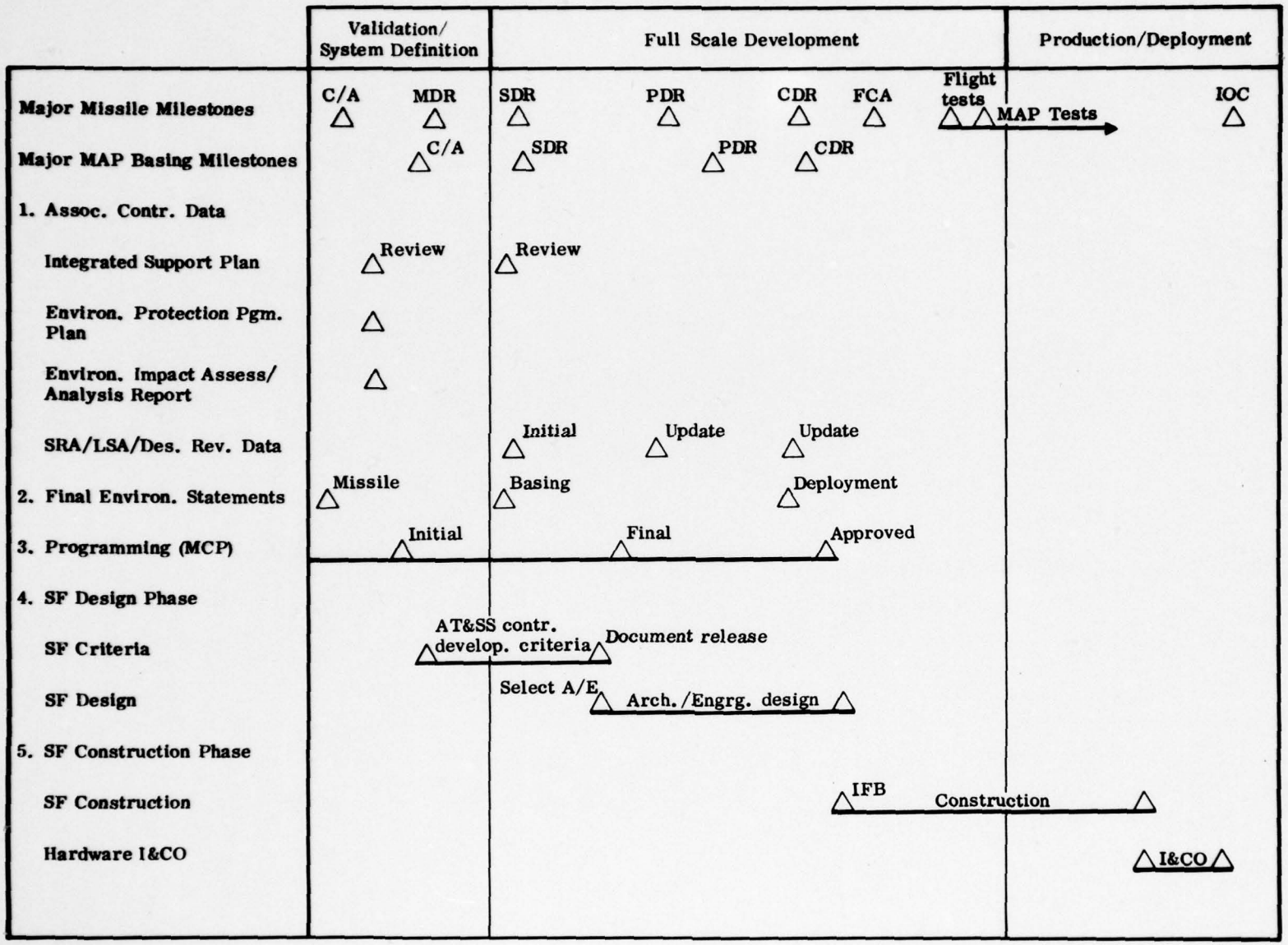
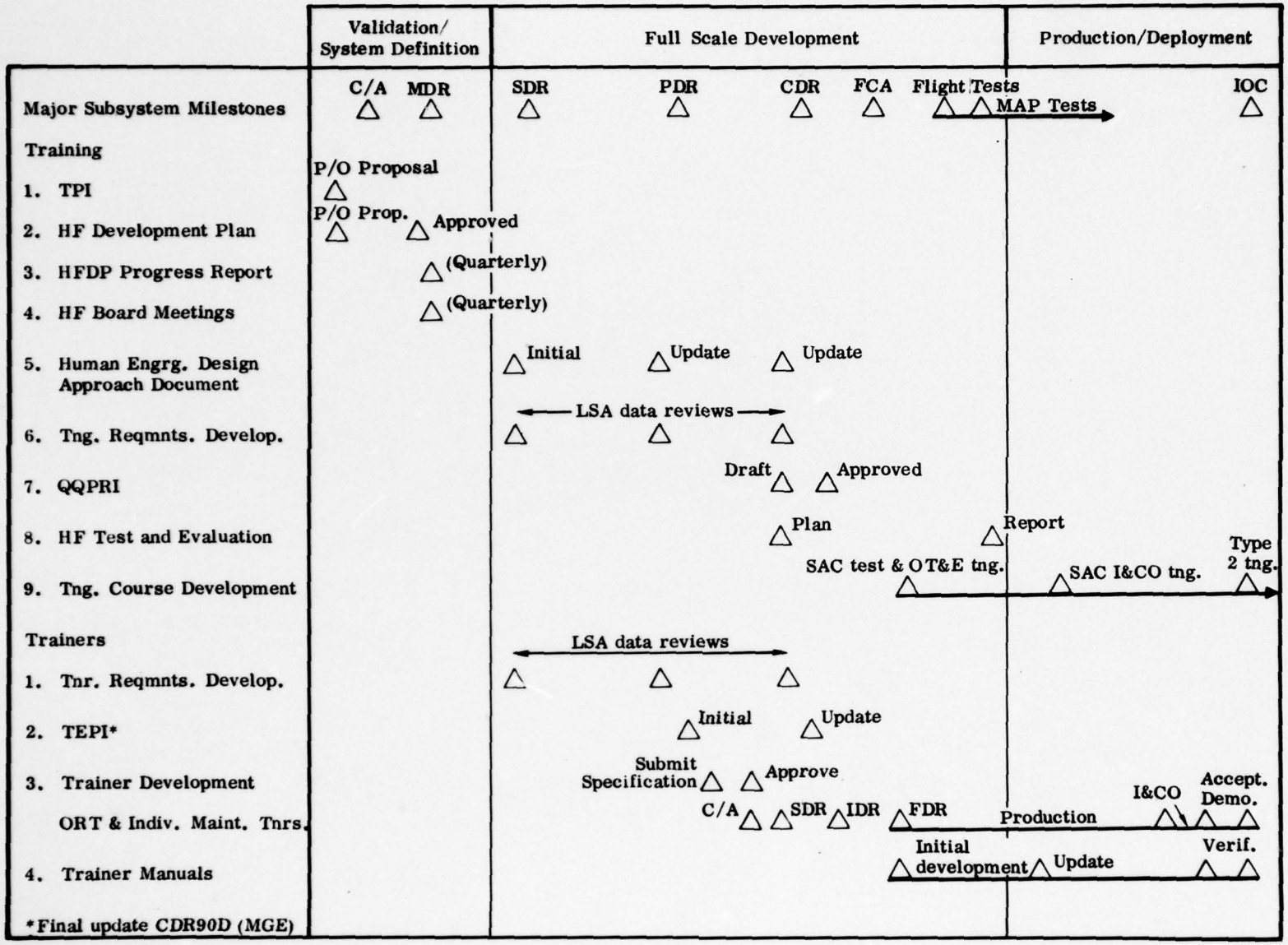


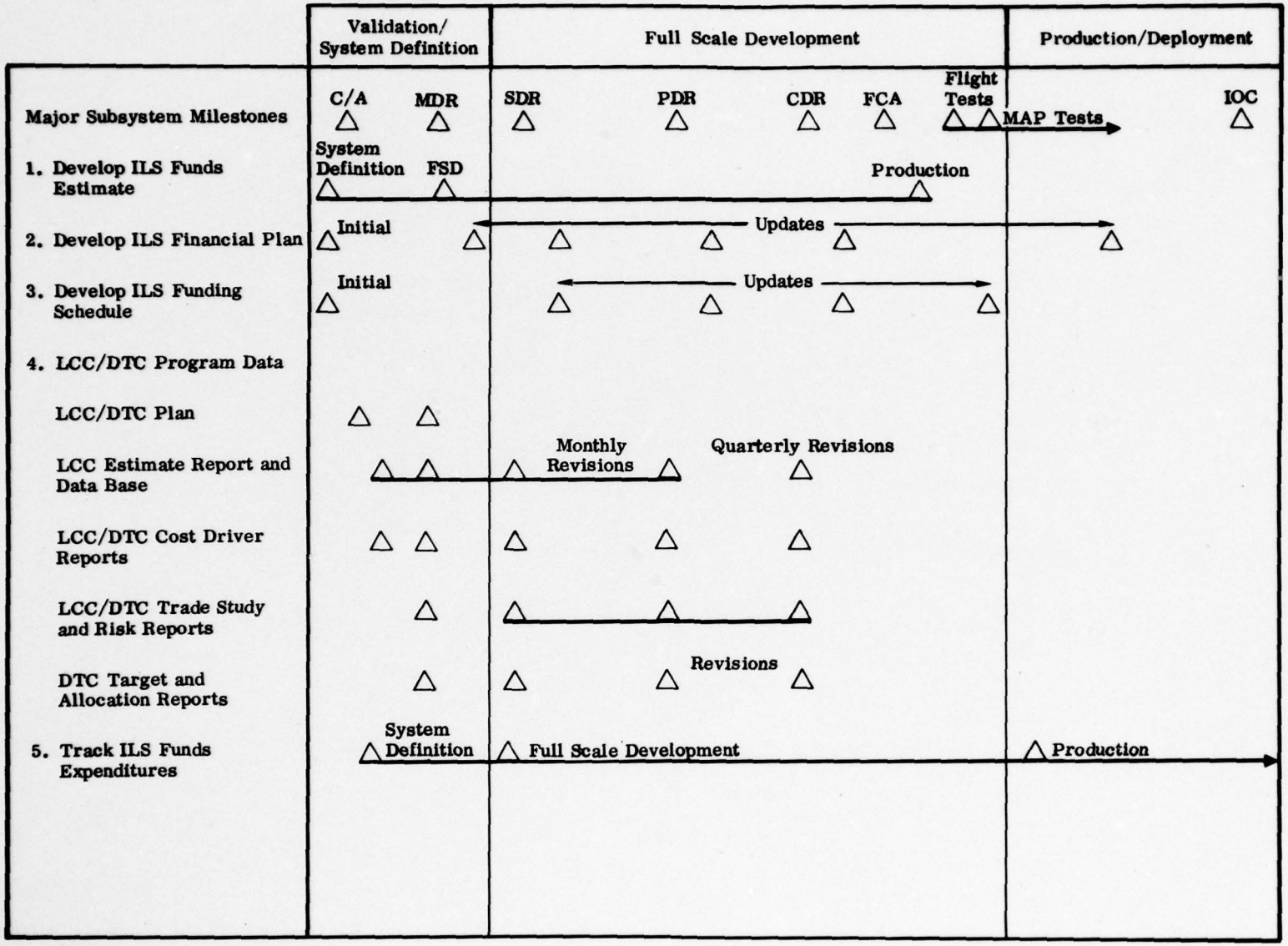
SUPPORT FACILITIES ELEMENT SCHEDULE



PERSONNEL AND TRAINING ELEMENT SCHEDULE



LOGISTIC SUPPORT RESOURCE FUNDS ELEMENT SCHEDULE



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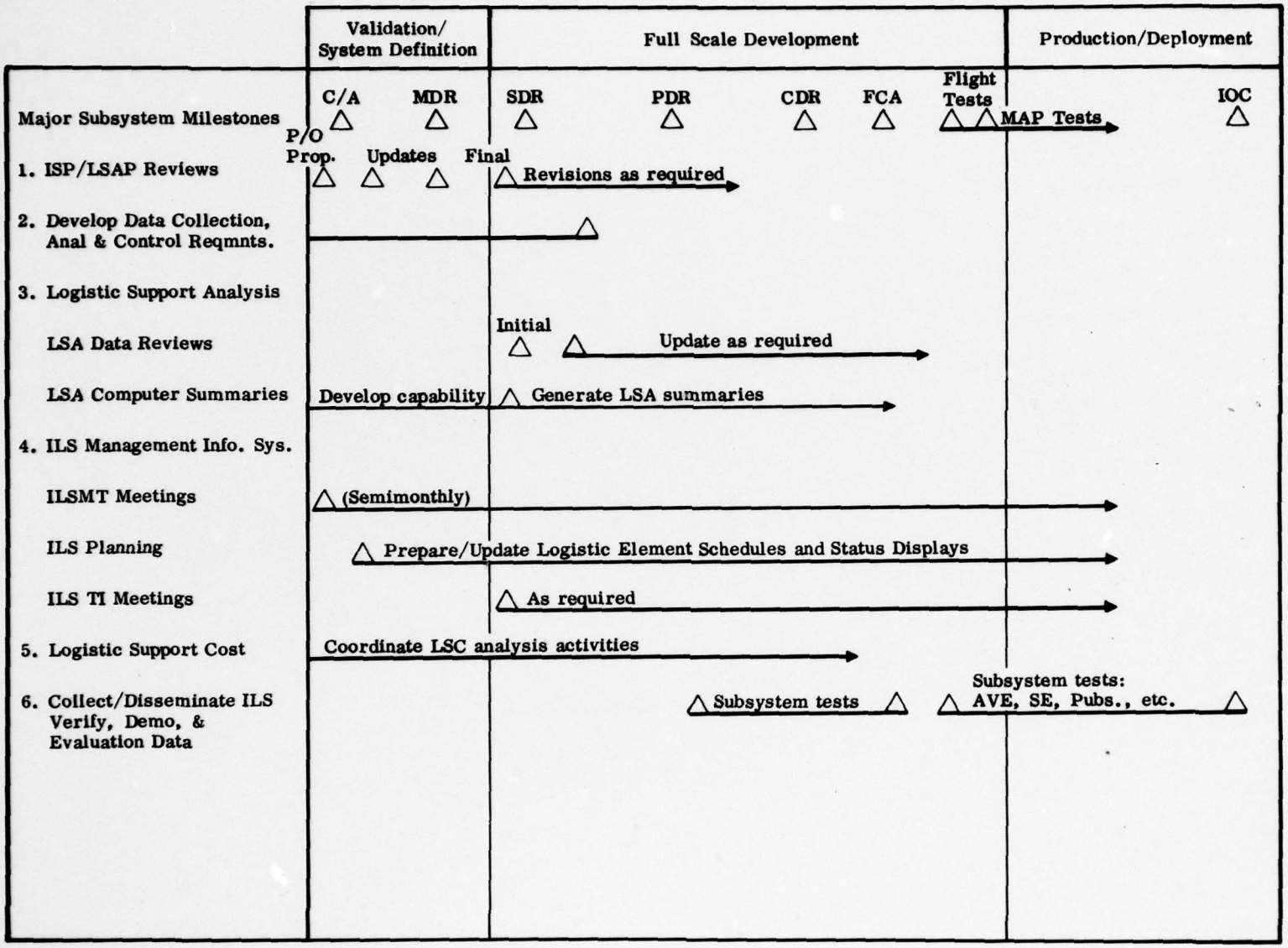
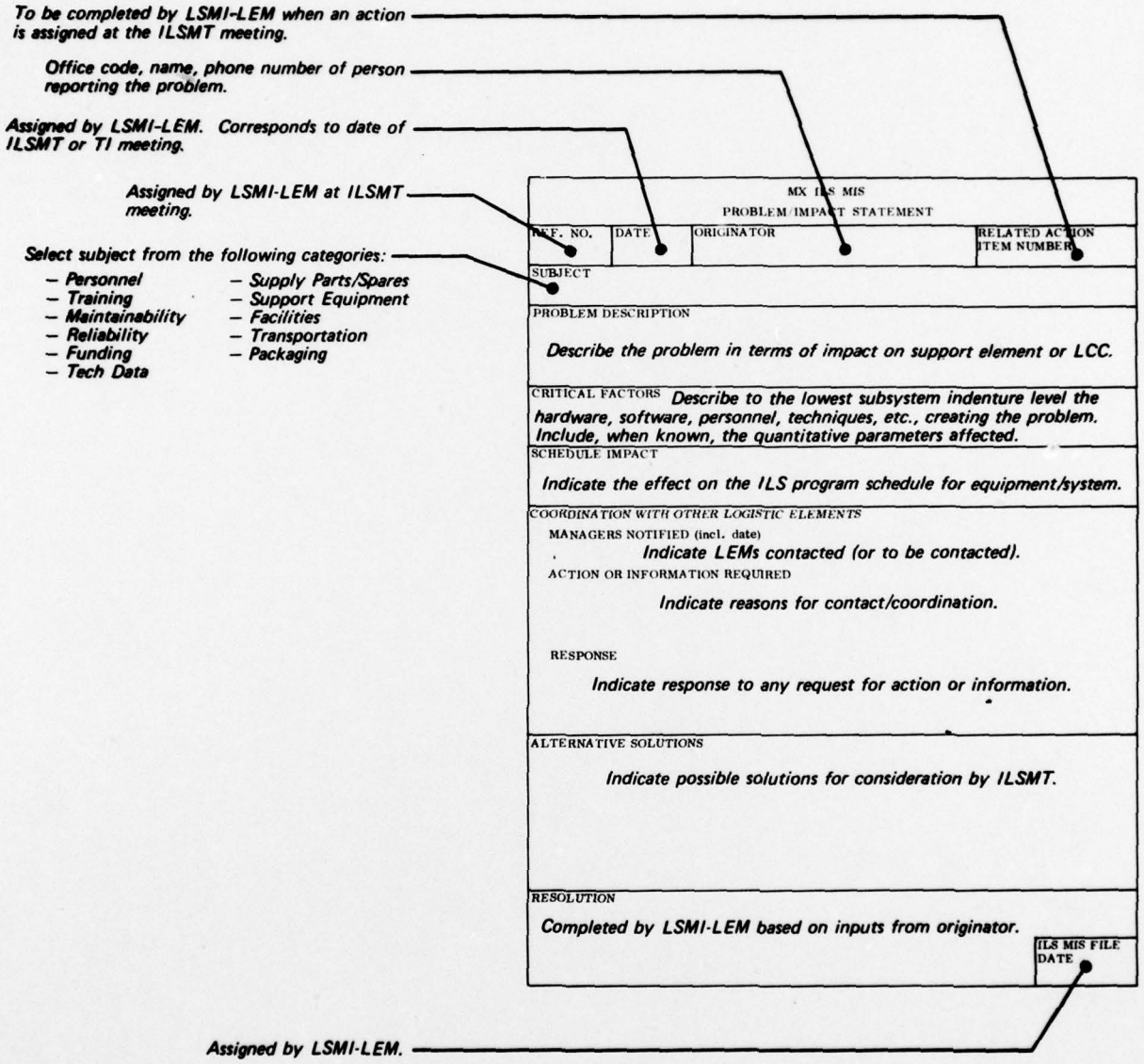
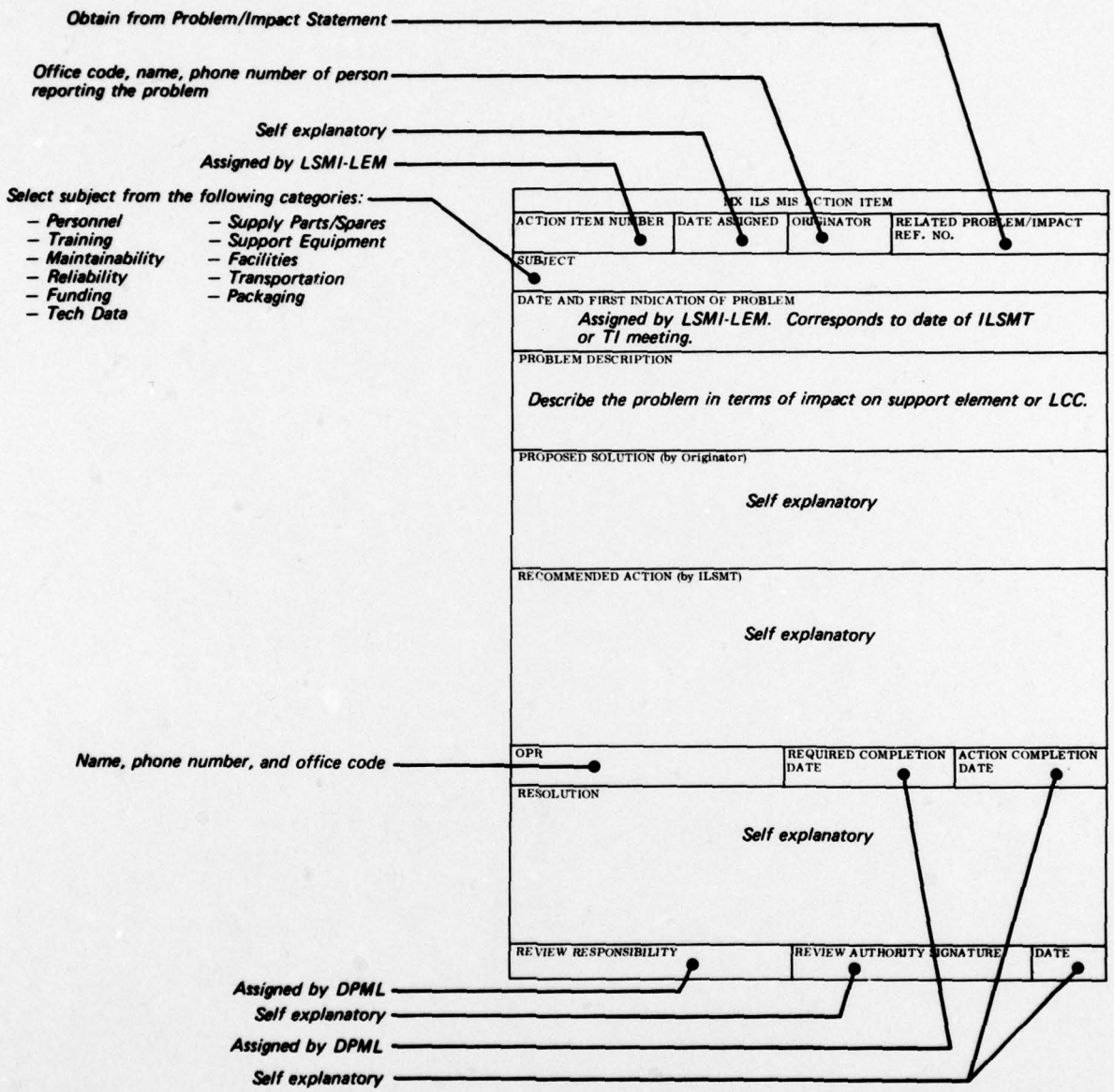


APPENDIX C.1

INSTRUCTIONS FOR COMPLETING PROBLEM/IMPACT STATEMENT FORM



APPENDIX C.2
INSTRUCTIONS FOR COMPLETING ACTION ITEM FORM



APPENDIX C.3

ACTION ITEM STATUS BOARD				
Item No.	Action Assigned (Date)	Date Req'd	Action Status	OPR

APPENDIX D

COMPUTERIZED DATA SOURCES		
Computerized Data Base	Availability	OPR
Logistic Support Analysis Record Data	Prior to MX FSD	SAMSO/MNLA
Logistic Support Cost Analysis Data	In use	OO-ALC/MMGX
LCC/DTC Data Base	Prior to MX Sys. Def.	SAMSO/MNPC
MINUTEMAN Operational Data Bank	In use	SAMSO/MNBR
MINUTEMAN Standard Parts Data	In use	SAMSO/MNBR
MINUTEMAN Test Data System	In use	SAMSO/MNNT
Secure Test Data System	In use	SAMSO/MNNT
Vulnerability and Hardness Data	In use	OO-ALC/MMED

APPENDIX E
INFORMATION QUALITY RATING

In general, much of the management information associated with the MX Management Information System will involve estimates or other planning data in which the quality of the data will vary over some acceptable range. The data quality criteria defined herein essentially identify the activities involved in preparing the data element or product. These criteria are based on how the data item was derived, and hence imply the potential for variation between the estimated and actual value. The relative quality of a data item is, of course, critical in the context of its intended use. Therefore, additional evaluation criteria have been developed to identify the significance of a data item in terms of MX Program schedule and budget impact.

E.1 DATA QUALITY CRITERIA

The criteria provided for use by the LEMs in describing the relative quality of MIS data are presented in Table E-1. Parameters for both budgetary and non-budgetary items are defined. The data quality parameter represents the first of three digits that make up the Information Quality Rating (IQR), discussed in Section E.4, which is applicable to both input and output information processed by the MIS.

E.2 SCHEDULE IMPACT CRITERIA

The evaluation criteria to be used by the LEMs in identifying the significance of a data item in terms of schedule impact are presented in Table E-2. As used in the table, a critical impact occurs when a change in any scheduled event either 1) affects a final event, or 2) changes the planned availability date of an item which results from a sequence of events. A significant impact occurs when a change in an intermediate event causes a change in another intermediate event, but does not affect a final event or the planned availability date of the item which results from a sequence of events. A minor impact occurs when a change in a scheduled event does not affect any other event.

The schedule impact parameter represents the second digit of the IQR.

E.3 BUDGET IMPACT CRITERIA

The evaluation criteria to be used by the LEMs in identifying the significance of a data item in terms of budget impact are presented in Table E-3. As used in the table, a "critical impact" occurs when an item comprises more than 30 percent of the

TABLE E-1. DATA QUALITY CRITERIA

Quality Parameter	Description of Criteria
	A. BUDGETARY ITEMS
6	Estimate based on existing contract or evaluation of firm quotations for major material items.
5	Estimate based on contract plans or evaluation of contractor proposals.
4	Estimate based on an engineering analysis of detailed characteristics of item under consideration.
3	Estimate based on technical feasibility studies and/or extracted from higher quality estimates of similar items.
2	Estimate developed by mathematical model and based on cost estimating relationships and basic design parameters.
1	Quick-cost estimate prepared in absence of minimum design and cost information and based on gross parameters.
0	Directed cost estimate generally involving a total cost restriction derived without a developed design or a detailed cost estimate. May be a revision imposed on previous cost estimates (1 through 6) to conform to budget cuts or restrictions.
	B. NON-BUDGETARY ITEMS
6	Data based on results of actual in-service performance.
5	Data based on large-scale testing or evaluation of in-service type items.
4	Data based on limited testing or evaluation of R&D items.
3	Data based on detailed design studies.
2	Data based on limited design studies.
1	Data based on estimates using, where applicable, data from similar items.
0	Data presumed to be a certain figure or date; in some cases, a target figure or date whose ultimate achievability is presumed.

TABLE E-2. SCHEDULE IMPACT CRITERIA

Schedule Parameter	Description of Criteria
5	Item has critical impact on more than one logistic element (LE) schedule.
4	Item has critical impact on only one LE schedule.
3	Item has significant impact on more than one LE schedule.
2	Item has significant impact on only one LE schedule.
1	Item has only minor impact on any LE schedule.
0	Item has no impact on any LE schedule.

TABLE E-3. BUDGET IMPACT CRITERIA

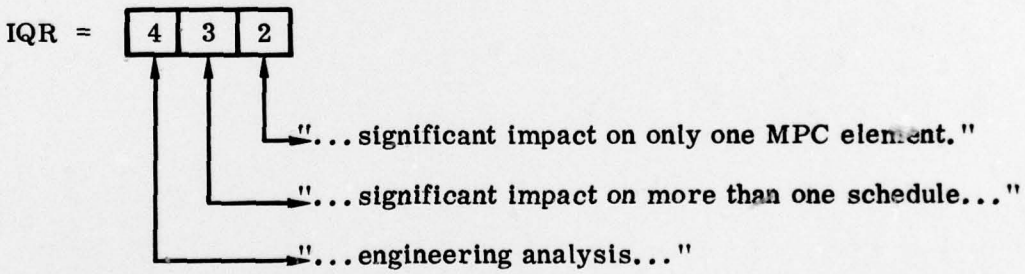
Budget Parameter	Description of Criteria
5	Item has critical impact on more than one MPC element.
4	Item has critical impact on only one MPC element.
3	Item has significant impact on more than one MPC element.
2	Item has significant impact on only one MPC element.
1	Item has only minor impact on any MPC element.
0	Item has no impact on any MPC element.

total cost of the Materiel Program Code (MPC) element, or when a reduction in the funds available deletes the procurement of the item. A deletion is not critical if the requirement for the item goes away. A "significant impact" occurs when an item accounts for 10 to 30 percent of the total cost of the MPC element, or when a reduction in the funds available reduces the scope of the item within acceptable limits. A reduction in scope may include a partial funding case in which the lost funds are recovered in the next fiscal year budget. A "minor impact" occurs when an item accounts for less than 10 percent of the total cost of the MPC element, or a reduction in funds available reduces the scope of the item to within acceptable limits. In this case, the lost funds are not recovered.

The budget impact parameter shown in the table represents the third digit of the IQR.

E.4 INFORMATION QUALITY RATING

Application of the above evaluation criteria will occur through the use of an Information Quality Rating. The individual (primarily LEMs) providing the information is required to assign an IQR to identify the quality and significance of the item. The composition of the IQR is described by the following example:



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